

Sequence Listing

SEQUENCE LISTING

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5      <110> Suzanne L. Bolten
          Alan M. Easton
          Leslie C. Engel
          Dean M. Messing
          John S. Ng
10     Beverly A. Reitz
          Scott A. Vaccaro
          Mark C. Walker
          Ping T. Wang
          Robin A. Weinberg
15     <120> Aspergillus ochraceus 11 alpha
          hydroxylase and oxidoreductase

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	aga ctg gcc aag gaa ggc tcc cag cga ttc ggt ctc aag acc atg gtg 526		
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	Ala Asp Leu Glu Asp Tyr Asp Tyr Glu Asn Leu Glu Lys Phe Pro Glu		
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	Asp Lys Val Val Phe Phe Val Leu Ala Thr Tyr Gly Glu Gly Pro		
	115	120	125
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	Thr Asp Asn Ala Val Glu Phe Tyr Gln Phe Val Thr Gly Glu Asp Ala		
	135	140	145
20	gct ttc gag agc ggc gct acc gcc gac gat aag cct ctg tct tct ctc		718
	Ala Phe Glu Ser Gly Ala Thr Ala Asp Asp Lys Pro Leu Ser Ser Leu		
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	Lys Tyr Val Thr Phe Gly Leu Gly Asn Asn Thr Tyr Glu His Tyr Asn		
	165	170	175
30	gct atg gtt cgc aat gtg gac gcc gct ctc aca aag ttc ggc gcc caa		814
	Ala Met Val Arg Asn Val Asp Ala Ala Leu Thr Lys Phe Gly Ala Gln		
	180	185	190
35	cgc att ggc tct gct ggt gag ggt gac gac ggc gct ggt aca atg gaa		862
	Arg Ile Gly Ser Ala Gly Glu Gly Asp Asp Gly Ala Gly Thr Met Glu		
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	Glu Asp Phe Leu Ala Trp Lys Glu Pro Met Trp Ala Ala Leu Ser Glu		
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	Ala Met Asn Leu Gln Glu Arg Asp Ala Val Tyr Glu Pro Val Phe Asn		
	230	235	240
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	Val Thr Glu Asp Glu Ser Leu Ser Pro Glu Asp Glu Asn Val Tyr Leu		
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55	ggt gag ccc act caa ggt cat ctc caa ggc gag ccc aag ggc ccg tac		1054
	Gly Glu Pro Thr Gln Gly His Leu Gln Gly Glu Pro Lys Gly Pro Tyr		
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55	tct gcg cac aac ccg ttc atc gct ccc atc tcc gaa tct cgt gaa ctg		1102
	Ser Ala His Asn Pro Phe Ile Ala Pro Ile Ser Glu Ser Arg Glu Leu		
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	Phe Asn Val Lys Asp Arg Asn Cys Leu His Met Glu Ile Ser Ile Ala		
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	Gly Ser Asn Leu Thr Tyr Gln Thr Gly Asp His Ile Ala Val Trp Pro		

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	acc aac gcc ggt tcc gag gtc gat cgg ttc ctg cag gct ttt ggt ctc			
	Thr Asn Ala Gly Ser Glu Val Asp Arg Phe Leu Gln Ala Phe Gly Leu			
	325	330	335	
10				1294
	gaa gga aag cgc cac tcc gtc atc aac att aag ggt atc gat gtg acc			
	Glu Gly Lys Arg His Ser Val Ile Asn Ile Lys Gly Ile Asp Val Thr			
	340	345	350	
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	gct aag gtt ccg att ccc act cct acg acc tat gac gcc gca gtt cgc			
	Ala Lys Val Pro Ile Pro Thr Pro Thr Tyr Asp Ala Ala Val Arg			
	355	360	365	370
20				1390
	tac tac ctg gaa gtc tgt gcc ccc gtt tcc cgt cag ttt gtc tcg act			
	Tyr Tyr Leu Glu Val Cys Ala Pro Val Ser Arg Gln Phe Val Ser Thr			
	375	380	385	
25				1438
	ctc gct gcc ttt gcc cct gat gaa gcg acc aag gcg gag atc gtt cgt			
	Leu Ala Ala Phe Ala Pro Asp Glu Ala Thr Lys Ala Glu Ile Val Arg			
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	ttg ggt ggc gac aag gac tat ttc cat gag aag att acc aac cga tgc			
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	420	425	430	
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45				1630
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	Gln Asn Gly Glu Pro Ser Pro Asp Pro His Gly Leu Thr Tyr Ser Ile			
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	Thr Gly Pro Arg Asn Lys Tyr Asp Gly Ile His Val Pro Val His Val			
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	Arg His Ser Asn Phe Lys Leu Pro Ser Asp Pro Ser Arg Pro Val Ile			
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5	gag cgt gct gcc ttg gcc gcg aag ggc gag aag gtc gga act acc ttg Glu Arg Ala Ala Leu Ala Ala Lys Gly Glu Lys Val Gly Thr Thr Leu	565	570	575	1966	
10	ctt ttc ttc ggc tgc cgt aag tcc gac gaa gat ttc ttg tac aag gat Leu Phe Phe Gly Cys Arg Lys Ser Asp Glu Asp Phe Leu Tyr Lys Asp	580	585	590	2014	
15	gaa tgg aag act ttt cag gag cag ctt ggc gac tcg ctc aag atc atc Glu Trp Lys Thr Phe Gln Glu Leu Gly Asp Ser Leu Lys Ile Ile	595	600	605	610	2062
20	act gcc ttc tct cgt gaa tcg gct gag aaa gtc tac gtc cag cac agg Thr Ala Phe Ser Arg Glu Ser Ala Glu Lys Val Tyr Val Gln His Arg	615	620	625	2110	
25	ctg cgt gag cat gcc gag ctg gtc agt gac ctg ctg aag cag aaa gcc Leu Arg Glu His Ala Glu Leu Val Ser Asp Leu Leu Lys Gln Lys Ala	630	635	640	2158	
30	act ttc tat gtt tgc ggt gac gct gcc aac atg gcc cgt gaa gtc aac Thr Phe Tyr Val Cys Gly Asp Ala Ala Asn Met Ala Arg Glu Val Asn	645	650	655	2206	
35	ctc gtg ctt ggg caa atc att gcc aag cag cgc ggt ctc cct gcc gag Leu Val Leu Gly Gln Ile Ile Ala Lys Gln Arg Gly Leu Pro Ala Glu	660	665	670	2254	
40	aag ggc gag gag atg gtg aag cac atg cgc agc agc ggc agc tac cag Lys Gly Glu Glu Met Val Lys His Met Arg Ser Ser Gly Ser Tyr Gln	675	680	685	690	2302
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Pro Glu Asp Lys Val Val Phe Phe Val Leu Ala Thr Tyr Gly Glu Gly			
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10	Glu Pro Thr Asp Asn Ala Val Glu Phe Tyr Gln Phe Val Thr Gly Glu		
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Ser Leu Lys Tyr Val Thr Phe Gly Leu Gly Asn Asn Thr Tyr Glu His			
165	170	175	
15	Tyr Asn Ala Met Val Arg Asn Val Asp Ala Ala Leu Thr Lys Phe Gly		
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Ala Gln Arg Ile Gly Ser Ala Gly Glu Gly Asp Asp Gly Ala Gly Thr			
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Phe Asn Val Thr Glu Asp Glu Ser Leu Ser Pro Glu Asp Glu Asn Val			
245	250	255	
25	Tyr Leu Gly Glu Pro Thr Gln Gly His Leu Gln Gly Glu Pro Lys Gly		
	260	265	270
Pro Tyr Ser Ala His Asn Pro Phe Ile Ala Pro Ile Ser Glu Ser Arg			
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Trp Pro Thr Asn Ala Gly Ser Glu Val Asp Arg Phe Leu Gln Ala Phe			
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	355	360	365
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Val Arg Tyr Tyr Leu Glu Val Cys Ala Pro Val Ser Arg Gln Phe Val			
45	Ser Thr Leu Ala Ala Phe Ala Pro Asp Glu Ala Thr Lys Ala Glu Ile		
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Arg Cys Phe Asn Ile Ala Gln Ala Leu Gln Ser Ile Thr Ser Lys Pro			
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Phe Thr Ala Val Pro Phe Ser Leu Leu Ile Glu Gly Ile Thr Lys Leu			
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 Lys Leu Asn Met Lys Glu Ser Arg Gly Val Thr Val Arg Arg Glu Asp
 465 470 475 480
 Asp Leu Tyr Leu Thr Pro Val Asn Phe Ser Ser Ser Ser Pro Ala
 40 485 490 495

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 45 <213> Glycine max AAB94588

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 50 Thr Ser Ile Leu Phe Ile Phe Phe Val Phe Phe Lys Leu Val Gln Arg
 20 25 30
 Ser Asp Ser Lys Thr Ser Ser Thr Cys Lys Leu Pro Pro Gly Pro Arg
 35 40 45
 Thr Leu Pro Leu Ile Gly Asn Ile His Gln Ile Val Gly Ser Leu Pro
 55 50 55 60
 Val His Tyr Tyr Leu Lys Asn Leu Ala Asp Lys Tyr Gly Pro Leu Met
 65 70 75 80

	His Leu Lys Leu Gly Glu Val Ser Asn Ile Ile Val Thr Ser Pro Glu		
	85	90	95
	Met Ala Gln Glu Ile Met Lys Thr His Asp Leu Asn Phe Ser Asp Arg		
5	100	105	110
	Pro Asp Phe Val Leu Ser Arg Ile Val Ser Tyr Asn Gly Ser Gly Ile		
	115	120	125
	Val Phe Ser Gln His Gly Asp Tyr Trp Arg Gln Leu Arg Lys Ile Cys		
	130	135	140
10	Thr Val Glu Leu Leu Thr Ala Lys Arg Val Gln Ser Phe Arg Ser Ile		
	145	150	155
	Arg Glu Glu Glu Val Ala Glu Leu Val Lys Lys Ile Ala Ala Thr Ala		
	165	170	175
	Ser Glu Glu Gly Ser Ile Phe Asn Leu Thr Gln Ser Ile Tyr Ser		
	180	185	190
15	Met Thr Phe Gly Ile Ala Ala Arg Ala Ala Phe Gly Lys Lys Ser Arg		
	195	200	205
	Tyr Gln Gln Val Phe Ile Ser Asn Met His Lys Gln Leu Met Leu Leu		
	210	215	220
20	Gly Phe Ser Val Ala Asp Leu Tyr Pro Ser Ser Arg Val Phe Gln		
	225	230	235
	Met Met Gly Ala Thr Gly Lys Leu Glu Lys Val His Arg Val Thr Asp		
	245	250	255
	Arg Val Leu Gln Asp Ile Ile Asp Glu His Lys Asn Arg Asn Arg Ser		
	260	265	270
25	Ser Glu Glu Arg Glu Ala Val Glu Asp Leu Val Asp Val Leu Leu Lys		
	275	280	285
	Phe Gln Lys Glu Ser Glu Phe Arg Leu Thr Asp Asp Asn Ile Lys Ala		
	290	295	300
30	Val Ile Gln Asp Ile Phe Ile Gly Gly Glu Thr Ser Ser Val		
	305	310	315
	Val Glu Trp Gly Met Ser Glu Leu Ile Arg Asn Pro Arg Val Met Glu		
	325	330	335
	Glu Ala Gln Ala Glu Val Arg Arg Val Tyr Asp Ser Lys Gly Tyr Val		
	340	345	350
35	Asp Glu Thr Glu Leu His Gln Leu Ile Tyr Leu Lys Ser Ile Ile Lys		
	355	360	365
	Glu Thr Met Arg Leu His Pro Pro Val Pro Leu Leu Val Pro Arg Val		
	370	375	380
	Ser Arg Glu Arg Cys Gln Ile Asn Gly Tyr Glu Ile Pro Ser Lys Thr		
40	385	390	395
	Arg Ile Ile Ile Asn Ala Trp Ala Ile Gly Arg Asn Pro Lys Tyr Trp		
	405	410	415
	Gly Glu Thr Glu Ser Phe Lys Pro Glu Arg Phe Leu Asn Ser Ser Ile		
	420	425	430
45	Asp Phe Arg Gly Thr Asp Phe Glu Phe Ile Pro Phe Gly Ala Gly Arg		
	435	440	445
	Arg Ile Cys Pro Gly Ile Thr Phe Ala Ile Pro Asn Ile Glu Leu Pro		
	450	455	460
50	Leu Ala Gln Leu Leu Tyr His Phe Asp Trp Lys Leu Pro Asn Lys Met		
	465	470	475
	Lys Asn Glu Glu Leu Asp Met Thr Glu Ser Asn Gly Ile Thr Leu Arg		
	485	490	495
	Arg Gln Asn Asp Leu Cys Leu Ile Pro Ile Thr Arg Leu Pro		
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<213> Gibberella fujikuroi CAA75566

<400> 31

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 Pro Phe Tyr Ile Ala Ile Phe Val Phe Thr Leu Val Pro Trp Ala Ile
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 Arg Phe Ser Trp Leu Glu Leu Arg Lys Gly Ser Val Val Pro Leu Ala
 10 35 40 45
 Asn Pro Pro Asp Ser Leu Phe Gly Thr Gly Lys Thr Arg Arg Ser Phe
 50 55 60
 Val Lys Leu Ser Arg Glu Ile Leu Ala Lys Ala Arg Ser Leu Phe Pro
 65 70 75 80
 15 Asn Glu Pro Phe Arg Leu Ile Thr Asp Trp Gly Glu Val Leu Ile Leu
 85 90 95
 Pro Pro Asp Phe Ala Asp Glu Ile Arg Asn Asp Pro Arg Leu Ser Phe
 100 105 110
 Ser Lys Ala Ala Met Gln Asp Asn His Ala Gly Ile Pro Gly Phe Glu
 20 115 120 125
 Thr Val Ala Leu Val Gly Arg Glu Asp Gln Leu Ile Gln Lys Val Ala
 130 135 140
 Arg Lys Gln Leu Thr Lys His Leu Ser Ala Val Ile Glu Pro Leu Ser
 145 150 155 160
 25 Arg Glu Ser Thr Leu Ala Val Ser Leu Asn Phe Gly Glu Thr Thr Glu
 165 170 175
 Trp Arg Ala Ile Arg Leu Lys Pro Ala Ile Leu Asp Ile Ile Ala Arg
 180 185 190
 Ile Ser Ser Arg Ile Tyr Leu Gly Asp Gln Leu Cys Arg Asn Glu Ala
 30 195 200 205
 Trp Leu Lys Ile Thr Lys Thr Tyr Thr Asn Phe Tyr Thr Ala Ser
 210 215 220
 Thr Asn Leu Arg Met Phe Pro Arg Ser Ile Arg Pro Leu Ala His Trp
 225 230 235 240
 35 Phe Leu Pro Glu Cys Arg Lys Leu Arg Gln Glu Arg Lys Asp Ala Ile
 245 250 255
 Gly Ile Ile Thr Pro Leu Ile Glu Arg Arg Glu Leu Arg Arg Ala
 260 265 270
 Ala Ile Ala Ala Gly Gln Pro Leu Pro Val Phe His Asp Ala Ile Asp
 40 275 280 285
 Trp Ser Glu Gln Glu Ala Glu Ala Ala Gly Thr Gly Ala Ser Phe Asp
 290 295 300
 Pro Val Ile Phe Gln Leu Thr Leu Ser Leu Leu Ala Ile His Thr Thr
 305 310 315 320
 45 Tyr Asp Leu Leu Gln Gln Thr Met Ile Asp Leu Gly Arg His Pro Glu
 325 330 335
 Tyr Ile Glu Pro Leu Arg Gln Glu Val Val Gln Leu Leu Arg Glu Glu
 340 345 350
 Gly Trp Lys Lys Thr Thr Leu Phe Lys Met Lys Leu Leu Asp Ser Ala
 50 355 360 365
 Ile Lys Glu Ser Gln Arg Met Lys Pro Gly Ser Ile Val Thr Met Arg
 370 375 380
 Arg Tyr Val Thr Glu Asp Ile Thr Leu Ser Ser Gly Leu Thr Leu Lys
 385 390 395 400
 55 Lys Gly Thr Arg Leu Asn Val Asp Asn Arg Arg Leu Asp Asp Pro Lys
 405 410 415
 Ile Tyr Asp Asn Pro Glu Val Tyr Asn Pro Tyr Arg Phe Tyr Asp Met

	420	425	430
	Arg Ser Glu Ala Gly Lys Asp His Gly Ala Gln Leu Val Ser Thr Gly		
	435	440	445
	Ser Asn His Met Gly Phe Gly His Gly Gln His Ser Cys Pro Gly Arg		
5	450	455	460
	Phe Phe Ala Ala Asn Glu Ile Lys Val Ala Leu Cys His Ile Leu Val		
	465	470	475
	Lys Tyr Asp Trp Lys Leu Cys Pro Asp Thr Glu Thr Lys Pro Asp Thr		
	485	490	495
10	Arg Gly Met Ile Ala Lys Ser Ser Pro Val Thr Asp Ile Leu Ile Lys		
	500	505	510
	Arg Arg Glu Ser Val Glu Leu Asp Leu Glu Ala Ile		
	515	520	
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	Trp Asn Asp Thr Gln Gln His Gly Ser Trp Phe Ala Pro Leu Val Thr		
	20	25	30
25	Thr Ser Ala Gly Leu Leu Cys Leu Leu Tyr Leu Cys Ser Ser Gly		
	35	40	45
	Arg Arg Ser Asp Leu Pro Val Phe Asn Pro Lys Thr Trp Trp Glu Leu		
	50	55	60
	Thr Thr Met Arg Ala Lys Arg Asp Phe Asp Ala Asn Ala Pro Ser Trp		
30	65	70	75
	Ile Glu Ser Trp Phe Ser Gln Asn Asp Lys Pro Ile Arg Phe Ile Val		
	85	90	95
	Asp Ser Gly Tyr Cys Thr Ile Leu Pro Ser Ser Met Ala Asp Glu Phe		
	100	105	110
35	Arg Lys Met Lys Glu Leu Cys Met Tyr Lys Phe Leu Gly Thr Asp Phe		
	115	120	125
	His Ser His Leu Pro Gly Phe Asp Gly Phe Lys Glu Val Thr Arg Asp		
	130	135	140
	Ala His Leu Ile Thr Lys Val Val Met Asn Gln Phe Gln Thr Gln Ala		
40	145	150	155
	Pro Lys Tyr Val Lys Pro Leu Ala Asn Glu Ala Ser Gly Ile Ile Thr		
	165	170	175
	Asp Ile Phe Gly Asp Ser Asn Glu Trp His Thr Val Pro Val Tyr Asn		
	180	185	190
45	Gln Cys Leu Asp Leu Val Thr Arg Thr Val Thr Phe Ile Met Val Gly		
	195	200	205
	Ser Lys Leu Ala His Asn Glu Glu Trp Leu Asp Ile Ala Lys His His		
	210	215	220
	Ala Val Thr Met Ala Ile Gln Ala Arg Gln Leu Arg Leu Trp Pro Val		
50	225	230	235
	Ile Leu Arg Pro Leu Val His Trp Leu Glu Pro Gln Gly Ala Lys Leu		
	245	250	255
	Arg Ala Gln Val Arg Arg Ala Arg Gln Leu Leu Asp Pro Ile Ile Gln		
	260	265	270
55	Glu Arg Arg Ala Glu Arg Asp Ala Cys Arg Ala Lys Gly Ile Glu Pro		
	275	280	285
	Pro Arg Tyr Val Asp Ser Ile Gln Trp Phe Glu Asp Thr Ala Lys Gly		

	290	295	300	
	Lys Trp Tyr Asp Ala Ala Gly Ala Gln Leu Ala Met Asp Phe Ala Gly			
5	305	310	315	320
	Ile Tyr Gly Thr Ser Asp Leu Leu Ile Gly Gly Leu Val Asp Ile Val			
	325	330	335	
	Arg His Pro His Leu Leu Glu Pro Leu Arg Asp Glu Ile Arg Thr Val			
	340	345	350	
	Ile Gly Gln Gly Gly Trp Thr Pro Ala Ser Leu Tyr Lys Leu Lys Leu			
	355	360	365	
10	Leu Asp Ser Cys Leu Lys Glu Ser Gln Arg Val Lys Pro Val Glu Cys			
	370	375	380	
	Ala Thr Met Arg Ser Tyr Ala Leu Gln Asp Val Thr Phe Ser Asn Gly			
	385	390	395	400
	Thr Phe Ile Pro Lys Gly Glu Leu Val Ala Val Ala Ala Asp Arg Met			
15	405	410	415	
	Ser Asn Pro Glu Val Trp Pro Glu Pro Ala Lys Tyr Asp Pro Tyr Arg			
	420	425	430	
	Tyr Met Arg Leu Arg Glu Asp Pro Ala Lys Ala Phe Ser Ala Gln Leu			
	435	440	445	
20	Glu Asn Thr Asn Gly Asp His Ile Gly Phe Gly Trp His Pro Arg Ala			
	450	455	460	
	Cys Pro Gly Arg Phe Phe Ala Ser Lys Glu Ile Lys Met Met Leu Ala			
	465	470	475	480
	Tyr Leu Leu Ile Arg Tyr Asp Trp Lys Val Val Pro Asp Glu Pro Leu			
25	485	490	495	
	Gln Tyr Tyr Arg His Ser Phe Ser Val Arg Ile His Pro Thr Thr Lys			
	500	505	510	
	Leu Met Met Arg Arg Asp Glu Asp Ile Arg Leu Pro Gly Ser Leu			
	515	520	525	
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	<211> 388			
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	<213> Gibberella fujikuroi CAA75567			
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	Met Lys Thr Ser Phe Arg Trp Pro Arg Thr Ser Lys Trp Ser Ser Val			
40	20	25	30	
	Ser Leu Tyr Asp Met Met Leu Arg Thr Val Ala Leu Leu Ser Gly Arg			
	35	40	45	
	Ala Phe Val Gly Leu Pro Leu Cys Arg Asp Glu Gly Trp Leu Gln Ala			
	50	55	60	
45	Ser Ile Gly Tyr Thr Val Gln Cys Val Ser Ile Arg Asp Gln Leu Phe			
	65	70	75	80
	Thr Trp Ser Pro Val Leu Arg Pro Ile Ile Gly Pro Phe Leu Pro Ser			
	85	90	95	
	Val Arg Ser Val Arg Arg His Leu Arg Phe Ala Ala Glu Ile Met Ala			
50	100	105	110	
	Pro Leu Ile Ser Gln Ala Leu Gln Asp Glu Lys Gln His Arg Ala Asp			
	115	120	125	
	Thr Leu Leu Ala Asp Gln Thr Glu Gly Arg Gly Thr Phe Ile Ser Trp			
	130	135	140	
55	Leu Leu Arg His Leu Pro Glu Glu Leu Arg Thr Pro Glu Gln Val Gly			
	145	150	155	160
	Leu Asp Gln Met Leu Val Ser Phe Ala Ala Ile His Thr Thr Met			

	165	170	175	
	Ala Leu Thr Lys Val Val Trp Glu Leu Val Lys Arg Pro Glu Tyr Ile			
	180	185	190	
5	Glu Pro Leu Arg Thr Glu Met Gln Asp Val Phe Gly Pro Asp Ala Val			
	195	200	205	
	Ser Pro Asp Ile Cys Ile Asn Lys Glu Ala Leu Ser Arg Leu His Lys			
	210	215	220	
	Leu Asp Ser Phe Ile Arg Glu Val Gln Arg Trp Cys Pro Ser Thr Phe			
	225	230	235	240
10	Val Thr Pro Ser Arg Arg Val Met Lys Ser Met Thr Leu Ser Asn Gly			
	245	250	255	
	Ile Lys Leu Gln Arg Gly Thr Ser Ile Ala Phe Pro Ala His Ala Ile			
	260	265	270	
	His Met Ser Glu Glu Thr Pro Thr Phe Ser Pro Asp Phe Ser Ser Asp			
15	275	280	285	
	Phe Glu Asn Pro Ser Pro Arg Ile Phe Asp Gly Phe Arg Tyr Leu Asn			
	290	295	300	
	Leu Arg Ser Ile Lys Gly Gln Gly Ser Gln His Gln Ala Ala Thr Thr			
	305	310	315	320
20	Gly Pro Asp Tyr Leu Ile Phe Asn His Gly Lys His Ala Cys Pro Gly			
	325	330	335	
	Arg Phe Phe Ala Ile Ser Glu Ile Lys Met Ile Leu Ile Glu Leu Leu			
	340	345	350	
	Ala Lys Tyr Asp Phe Arg Leu Glu Asp Gly Lys Pro Gly Pro Glu Leu			
25	355	360	365	
	Met Arg Val Gly Thr Glu Thr Arg Leu Asp Thr Lys Ala Gly Leu Glu			
	370	375	380	
	Met Arg Arg Arg			
	385			
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	<210> 34			
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	<213> Gibberella fujikuroi CAA76703			
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	<400> 34			
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	Gln Gln Leu Val Leu Gly Leu Asp Arg Met Pro Leu Met Asp Val His			
40	20	25	30	
	Trp Leu Ile Tyr Val Ala Phe Gly Ala Trp Leu Cys Ser Tyr Val Ile			
	35	40	45	
	His Val Leu Ser Ser Ser Thr Val Lys Val Pro Val Val Gly Tyr			
	50	55	60	
45	Arg Ser Val Phe Glu Pro Thr Trp Leu Leu Arg Leu Arg Phe Val Trp			
	65	70	75	80
	Glu Gly Gly Ser Ile Ile Gly Gln Gly Tyr Asn Lys Phe Lys Asp Ser			
	85	90	95	
	Ile Phe Gln Val Arg Lys Leu Gly Thr Asp Ile Val Ile Ile Pro Pro			
50	100	105	110	
	Asn Tyr Ile Asp Glu Val Arg Lys Leu Ser Gln Asp Lys Thr Arg Ser			
	115	120	125	
	Val Glu Pro Phe Ile Asn Asp Phe Ala Gly Gln Tyr Thr Arg Gly Met			
	130	135	140	
55	Val Phe Leu Gln Ser Asp Leu Gln Asn Arg Val Ile Gln Gln Arg Leu			
	145	150	155	160
	Thr Pro Lys Leu Val Ser Leu Thr Lys Val Met Lys Glu Glu Leu Asp			

	165	170	175
	Tyr Ala Leu Thr Lys Glu Met Pro Asp Met Lys Asn Asp Glu Trp Val		
	180	185	190
5	Glu Val Asp Ile Ser Ser Ile Met Val Arg Leu Ile Ser Arg Ile Ser		
	195	200	205
	Ala Arg Val Phe Leu Gly Pro Glu His Cys Arg Asn Gln Glu Trp Leu		
	210	215	220
	Thr Thr Thr Ala Glu Tyr Ser Glu Ser Leu Phe Ile Thr Gly Phe Ile		
	225	230	235
10	240		
	Leu Arg Val Val Pro His Ile Leu Arg Pro Phe Ile Ala Pro Leu Leu		
	245	250	255
	Pro Ser Tyr Arg Thr Leu Leu Arg Asn Val Ser Ser Gly Arg Arg Val		
	260	265	270
15	Ile Gly Asp Ile Ile Arg Ser Gln Gln Gly Asp Gly Asn Glu Asp Ile		
	275	280	285
	Leu Ser Trp Met Arg Asp Ala Ala Thr Gly Glu Glu Lys Gln Ile Asp		
	290	295	300
	Asn Ile Ala Gln Arg Met Leu Ile Leu Ser Leu Ala Ser Ile His Thr		
	305	310	315
20	320		
	Thr Ala Met Thr Met Thr His Ala Met Tyr Asp Leu Cys Ala Cys Pro		
	325	330	335
	Glu Tyr Ile Glu Pro Leu Arg Asp Glu Val Lys Ser Val Val Gly Ala		
	340	345	350
25	Ser Gly Trp Asp Lys Thr Ala Leu Asn Arg Phe His Lys Leu Asp Ser		
	355	360	365
	Phe Leu Lys Glu Ser Gln Arg Phe Asn Pro Val Phe Leu Leu Thr Phe		
	370	375	380
	Asn Arg Ile Tyr His Gln Ser Met Thr Leu Ser Asp Gly Thr Asn Ile		
	385	390	395
30	400		
	Pro Ser Gly Thr Arg Ile Ala Val Pro Ser His Ala Met Leu Gln Asp		
	405	410	415
	Ser Ala His Val Pro Gly Pro Thr Pro Pro Thr Glu Phe Asp Gly Phe		
	420	425	430
35	Arg Tyr Ser Lys Ile Arg Ser Asp Ser Asn Tyr Ala Gln Lys Tyr Leu		
	435	440	445
	Phe Ser Met Thr Asp Ser Ser Asn Met Ala Phe Gly Tyr Gly Lys Tyr		
	450	455	460
	Ala Cys Pro Gly Arg Phe Tyr Ala Ser Asn Glu Met Lys Leu Thr Leu		
	465	470	475
40	480		
	Ala Ile Leu Leu Gln Phe Glu Phe Lys Leu Pro Asp Gly Lys Gly		
	485	490	495
	Arg Pro Arg Asn Ile Thr Ile Asp Ser Asp Met Ile Pro Asp Pro Arg		
	500	505	510
	Ala Arg Leu Cys Val Arg Lys Arg Ser Leu Arg Asp Glu		
45	515	520	525
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55	15		
	Ala Arg Ile Lys Asp Gln Trp Thr Lys Gly Arg Lys Arg Val Met Ala		
	20	25	30
	Ser Met Arg Glu Arg Gln Glu Lys Gly Gly Asn Leu Glu Asp Pro Pro		

	35	40	45
	Thr Met Leu Asp His Leu Ser Asn Gly Arg Asn Glu His Ile Ala Asp		
	50	55	60
	Asp Val Glu Leu Gln Leu Leu His Gln Met Thr Leu Ile Ala Val Gly		
5	65	70	75
	Thr Val Thr Phe Ser Ser Thr Thr Gln Ala Ile Tyr Asp Leu Val		
	85	90	95
	Ala His Pro Glu Tyr Ile Thr Ile Leu Arg Glu Glu Val Glu Ser Val		
	100	105	110
10	Pro Arg Asp Pro Asn Gly Asn Phe Thr Lys Asp Ser Thr Val Ala Met		
	115	120	125
	Asp Lys Leu Asp Ser Phe Leu Lys Glu Ser Gln Arg Phe Asn Ser Pro		
	130	135	140
	Asp Leu Ser Met Ser Asn Leu Lys Asn Tyr Lys Leu Cys Glu Ser Leu		
15	145	150	155
	Thr Gly His Ser Asn Leu Pro Thr Arg Thr Ile Ala Asp Met Lys Leu		
	165	170	175
	Pro Asp Gly Thr Phe Val Pro Lys Gly Thr Lys Leu Glu Ile Asn Thr		
	180	185	190
20	Cys Ser Ile His Lys Asp His Lys Leu Tyr Glu Asn Pro Glu Gln Phe		
	195	200	205
	Asp Gly Leu Arg Phe His Lys Trp Arg Lys Ala Pro Gly Lys Glu Lys		
	210	215	220
	Arg Tyr Met Tyr Ser Ser Ser Gly Thr Asp Asp Leu Ser Trp Gly Phe		
25	225	230	235
	Gly Arg His Ala Cys Pro Gly Arg Tyr Leu Ser Ala Ile Asn Ile Lys		
	245	250	255
	Leu Ile Met Ala Glu Leu Leu Met Asn Tyr Asp Ile Lys Leu Pro Asp		
	260	265	270
30	Gly Leu Ser Arg Pro Lys Asn Ile Glu Phe Glu Val Leu Ala Ser Leu		
	275	280	285
	Asn Ala Cys Ala Asn Ala		
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35	<210> 36		
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	Phe Ile Tyr Ile Ile Leu Ala Arg Arg Glu Arg Phe Lys Leu Arg Glu		
	20	25	30
45	Lys Ile Gly Leu Ser Gly Pro Glu Pro His Trp Phe Leu Gly Asn Leu		
	35	40	45
	Lys Gln Thr Ala Glu Arg Lys Glu Lys Leu Gly Tyr Asp Asp Ala Asn		
	50	55	60
	Arg Trp Phe Asn Glu Leu His Glu Gln Tyr Gly Glu Thr Phe Gly Ile		
50	65	70	75
	Tyr Tyr Gly Ser Gln Met Asn Ile Val Ile Ser Asn Glu Lys Asp Ile		
	85	90	95
	Lys Glu Val Phe Ile Lys Asn Phe Ser Asn Phe Ser Asp Arg Ser Val		
	100	105	110
55	Pro Ser Ile Tyr Glu Ala Asn Gln Leu Thr Ala Ser Leu Leu Met Asn		
	115	120	125
	Ser Tyr Ser Ser Gly Trp Lys His Thr Arg Ser Ala Ile Ala Pro Ile		

	130	135	140
	Phe Ser Thr Gly Lys Met Lys Ala Met Gln Glu Thr Ile Asn Ser Lys		
145	150	155	160
	Val Asp Leu Phe Leu Asp Ile Leu Arg Glu Lys Ala Ser Ser Gly Gln		
5	165	170	175
	Lys Trp Asp Ile Tyr Asp Asp Phe Gln Gly Leu Thr Leu Asp Val Ile		
	180	185	190
	Gly Lys Cys Ala Phe Ala Ile Asp Ser Asn Cys Gln Arg Asp Arg Asn		
	195	200	205
10	Asp Val Phe Tyr His Pro Val Thr Val Lys Ile Thr Ile Asn Asn Phe		
	210	215	220
	Thr Tyr Phe His Ser Ser Pro Gly Thr Phe His Phe Leu Glu Ser		
225	230	235	240
	Thr Leu Gln Ile His Thr Thr Gly Arg Cys Arg Asn Ser Thr Cys Arg		
15	245	250	255
	Arg Thr Val Lys Cys Val Gly Phe Arg Gln Asp Lys Ala Lys Phe Cys		
	260	265	270
	Ser Asp Tyr Glu Arg Arg Gly Glu Gly Ser Asp Ser Val Asp		
	275	280	285
20	Leu Leu Lys Leu Leu Asn Arg Glu Asp Asp Lys Ser Lys Pro Met		
	290	295	300
	Thr Lys Gln Glu Val Ile Glu Asn Cys Phe Ala Phe Leu Leu Ala Gly		
305	310	315	320
	Tyr Glu Thr Thr Ser Thr Ala Met Thr Tyr Cys Ser Tyr Leu Leu Ser		
25	325	330	335
	Lys Tyr Pro Asn Val Gln Gln Lys Leu Tyr Glu Glu Ile Met Glu Ala		
	340	345	350
	Lys Glu Asn Gly Gly Leu Thr Tyr Asp Ser Ile His Asn Met Lys Tyr		
	355	360	365
30	Leu Asp Cys Val Tyr Lys Glu Thr Leu Arg Phe Tyr Pro Pro His Phe		
	370	375	380
	Ser Phe Ile Arg Arg Leu Cys Arg Glu Asp Ile Thr Ile Arg Gly Gln		
385	390	395	400
	Phe Tyr Pro Lys Gly Ala Ile Val Val Cys Leu Pro His Thr Val His		
35	405	410	415
	Arg Asn Pro Glu Asn Trp Asp Ser Pro Glu Glu Phe His Pro Glu Arg		
	420	425	430
	Phe Glu Asn Trp Glu Glu Lys Ser Ser Leu Lys Trp Ile Pro Phe		
	435	440	445
40	Gly Val Gly Pro Arg Tyr Cys Val Gly Met Arg Phe Ala Glu Met Glu		
	450	455	460
	Phe Lys Thr Thr Ile Val Lys Leu Leu Asp Thr Phe Glu Leu Lys Gln		
465	470	475	480
	Phe Glu Gly Glu Ala Asp Leu Ile Pro Asp Cys Asn Gly Val Ile Met		
45	485	490	495
	Arg Pro Asn Asp Pro Val Arg Leu His Leu Lys Pro Arg Asn		
	500	505	510
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50	<211> 691		
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	<400> 37		
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	Val Leu Ala Val Leu Leu Tyr Val Lys Arg Asn Ser Ile Lys Glu Leu		15

	20	25	30
	Leu Met Ser Asp Asp Gly Asp Ile Thr Ala Val Ser Ser Gly Asn Arg		
	35	40	45
	Asp Ile Ala Gln Val Val Thr Glu Asn Asn Lys Asn Tyr Leu Val Leu		
5	50	55	60
	Tyr Ala Ser Gln Thr Gly Thr Ala Glu Asp Tyr Ala Lys Lys Phe Ser		
	65	70	75
	Lys Glu Leu Val Ala Lys Phe Asn Leu Asn Val Met Cys Ala Asp Val		
	85	90	95
10	Glu Asn Tyr Asp Phe Glu Ser Leu Asn Asp Val Pro Val Ile Val Ser		
	100	105	110
	Ile Phe Ile Ser Thr Tyr Gly Glu Gly Asp Phe Pro Asp Gly Ala Val		
	115	120	125
	Asn Phe Glu Asp Phe Ile Cys Asn Ala Glu Ala Gly Ala Leu Ser Asn		
15	130	135	140
	Leu Arg Tyr Asn Met Phe Gly Leu Gly Asn Ser Thr Tyr Glu Phe Phe		
	145	150	155
	Asn Gly Ala Ala Lys Lys Ala Glu Lys His Leu Ser Ala Ala Gly Ala		
	165	170	175
20	Ile Arg Leu Gly Lys Leu Gly Glu Ala Asp Asp Gly Ala Gly Thr Thr		
	180	185	190
	Asp Glu Asp Tyr Met Ala Trp Lys Asp Ser Ile Leu Glu Val Leu Lys		
	195	200	205
	Asp Glu Leu His Leu Asp Glu Gln Glu Ala Lys Phe Thr Ser Gln Phe		
25	210	215	220
	Gln Tyr Thr Val Leu Asn Glu Ile Thr Asp Ser Met Ser Leu Gly Glu		
	225	230	235
	Pro Ser Ala His Tyr Leu Pro Ser His Gln Leu Asn Arg Asn Ala Asp		
	245	250	255
30	Gly Ile Gln Leu Gly Pro Phe Asp Leu Ser Gln Pro Tyr Ile Ala Pro		
	260	265	270
	Ile Val Lys Ser Arg Glu Leu Phe Ser Ser Asn Asp Arg Asn Cys Ile		
	275	280	285
	His Ser Glu Phe Asp Leu Ser Gly Ser Asn Ile Lys Tyr Ser Thr Gly		
35	290	295	300
	Asp His Leu Ala Val Trp Pro Ser Asn Pro Leu Glu Lys Val Glu Gln		
	305	310	315
	Phe Leu Ser Ile Phe Asn Leu Asp Pro Glu Thr Ile Phe Asp Leu Lys		
	325	330	335
40	Pro Leu Asp Pro Thr Val Lys Val Pro Phe Pro Thr Pro Thr Ile		
	340	345	350
	Gly Ala Ala Ile Lys His Tyr Leu Glu Ile Thr Gly Pro Val Ser Arg		
	355	360	365
	Gln Leu Phe Ser Ser Leu Ile Gln Phe Ala Pro Asn Ala Asp Val Lys		
45	370	375	380
	Glu Lys Leu Thr Leu Leu Ser Lys Asp Lys Asp Gln Phe Ala Val Glu		
	385	390	395
	Ile Thr Ser Lys Tyr Phe Asn Ile Ala Asp Ala Leu Lys Tyr Leu Ser		
	405	410	415
50	Asp Gly Ala Lys Trp Asp Asn Val Pro Met Gln Phe Leu Val Glu Ser		
	420	425	430
	Val Pro Gln Met Thr Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Leu		
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	Ser Glu Lys Gln Thr Val His Val Thr Ser Ile Val Glu Asn Phe Pro		
55	450	455	460
	Asn Pro Glu Leu Pro Asp Ala Pro Pro Gly Val Gly Val Thr Thr Asn		
	465	470	475
			480

Leu Leu Arg Asn Ile Gln Leu Ala Gln Asn Asn Val Asn Ile Ala Glu
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 Thr Asn Leu Pro Val His Tyr Asp Leu Asn Gly Pro Arg Lys Leu Phe
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 5 Ala Asn Tyr Lys Leu Pro Val His Val Arg Arg Ser Asn Phe Arg Leu
 515 520 525
 Pro Ser Asn Pro Ser Thr Pro Val Ile Met Ile Gly Pro Gly Thr Gly
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 Val Ala Pro Phe Arg Gly Phe Ile Arg Glu Arg Val Ala Phe Leu Glu
 545 550 555 560
 10 Ser Gln Lys Lys Gly Gly Asn Asn Val Ser Leu Gly Lys His Ile Leu
 565 570 575
 Phe Tyr Gly Ser Arg Asn Thr Asp Asp Phe Leu Tyr Gln Asp Glu Trp
 580 585 590
 15 Pro Glu Tyr Ala Lys Lys Leu Asp Gly Ser Phe Glu Met Val Val Ala
 595 600 605
 His Ser Arg Leu Pro Asn Thr Lys Lys Val Tyr Val Gln Asp Lys Leu
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 Lys Asp Tyr Glu Asp Gln Val Phe Glu Met Ile Asn Asn Gly Ala Phe
 625 630 635 640
 20 Ile Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Lys Gly Val Ser Thr
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 Ala Leu Val Gly Ile Leu Ser Arg Gly Lys Ser Ile Thr Thr Asp Glu
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 35 40 45
 Ala Gly Lys Thr Arg Asn Ile Ile Glu Lys Met Glu Glu Thr Gly Lys
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 Asn Cys Val Ile Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Asp Tyr
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 45 Ala Ser Arg Leu Ala Lys Glu Gly Ser Gln Arg Phe Gly Leu Lys Thr
 85 90 95
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 50 Pro Glu Asp Lys Val Ala Phe Phe Val Leu Ala Thr Tyr Gly Glu Gly
 115 120 125
 Glu Pro Thr Asp Asn Ala Val Glu Phe Tyr Gln Phe Phe Thr Gly Asp
 130 135 140
 55 Asp Val Ala Phe Glu Ser Ala Ser Ala Asp Glu Lys Pro Leu Ser Lys
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 Leu Lys Tyr Val Ala Phe Gly Leu Gly Asn Asn Thr Tyr Glu His Tyr
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Asn Ala Met Val Arg Gln Val Asp Ala Ala Phe Gln Lys Leu Gly Pro
 180 185 190
 Gln Arg Ile Gly Ser Ala Gly Glu Gly Asp Asp Gly Ala Gly Thr Met
 195 200 205
 5 Glu Glu Asp Phe Leu Ala Trp Lys Glu Pro Met Trp Ala Ala Leu Ser
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 Glu Ser Met Asp Leu Glu Glu Arg Glu Ala Val Tyr Glu Pro Val Phe
 225 230 235 240
 Cys Val Thr Glu Asn Glu Ser Leu Ser Pro Glu Asp Glu Thr Val Tyr
 10 245 250 255
 Leu Gly Glu Pro Thr Gln Ser His Leu Gln Gly Thr Pro Lys Gly Pro
 260 265 270
 Tyr Ser Ala His Asn Pro Phe Ile Ala Pro Ile Ala Glu Ser Arg Glu
 275 280 285
 15 Leu Phe Thr Val Lys Asp Arg Asn Cys Leu His Met Glu Ile Ser Ile
 290 295 300
 Ala Gly Ser Asn Leu Ser Tyr Gln Thr Gly Asp His Ile Ala Val Trp
 305 310 315 320
 Pro Thr Asn Ala Gly Ala Glu Val Asp Arg Phe Leu Gln Val Phe Gly
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 Leu Glu Gly Lys Arg Asp Ser Val Ile Asn Ile Lys Gly Ile Asp Val
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 Thr Ala Lys Val Pro Ile Pro Thr Pro Thr Thr Tyr Asp Ala Ala Val
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 25 Arg Tyr Tyr Met Glu Val Cys Ala Pro Val Ser Arg Gln Phe Val Ala
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 Thr Leu Ala Ala Phe Ala Pro Met Arg Lys Ala Arg Gln Arg Leu Cys
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 Val Trp Val Ala Gln Gly Leu Phe Pro Arg Glu Gly His Gln Pro Met
 30 405 410 415
 Leu Gln His Ala Gln Ala Leu Gln Ser Ile Thr Ser Lys Pro Phe Ser
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 35 Arg Tyr Tyr Ser Ile Ser Ser Ser Leu Val Gln Lys Asp Lys Ile
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 Ser Ile Thr Ala Val Val Glu Ser Val Arg Leu Pro Gly Ala Ser His
 465 470 475 480
 Met Val Lys Gly Val Thr Thr Asn Tyr Leu Leu Ala Leu Lys Gln Lys
 40 485 490 495
 Gln Asn Gly Arg Ser Leu Ser Arg Pro Ser Arg Leu Asp Leu Leu His
 500 505 510
 His Gly Pro Arg Asn Lys Tyr Asp Gly Ile His Val Pro Val His Val
 515 520 525
 45 Arg His Ser Asn Phe Lys Leu Pro Ser Asp Pro Ser Arg Pro Ile Ile
 530 535 540
 Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly Phe Ile Gln
 545 550 555 560
 Glu Arg Ala Ala Leu Ala Ala Lys Gly Glu Lys Val Gly Pro Thr Val
 50 565 570 575
 Leu Phe Phe Gly Cys Arg Lys Ser Asp Glu Asp Phe Leu Tyr Lys Asp
 580 585 590
 Glu Trp Lys Thr Tyr Gln Asp Gln Leu Gly Asp Asn Leu Lys Ile Ile
 595 600 605
 55 Thr Ala Phe Ser Arg Glu Gly Pro Gln Lys Val Tyr Val Gln His Arg
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 Leu Arg Glu His Ser Glu Leu Val Ser Asp Leu Leu Lys Gln Lys Ala

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Thr Phe Tyr Val Cys Gly Asp Ala Ala Asn Met Ala Arg Glu Val Asn			
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Leu Val Leu Gly Gln Ile Ile Ala Ala Gln Arg Gly Leu Pro Ala Glu			
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Leu Ile Val Gly Val Leu Thr Tyr Trp Phe Ile Phe Lys Lys Lys Lys			
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Glu Glu Ile Pro Glu Phe Ser Lys Ile Gln Thr Thr Ala Pro Pro Val			
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Lys Glu Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn Ile			
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Ile Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala Asn			
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Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ser Ala			
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Asp Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu Ile			
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Asp Lys Ser Leu Val Val Phe Cys Met Ala Thr Tyr Gly Glu Gly Asp			
130	135	140	
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Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Thr Asp			
145	150	155	160
Val Asp Leu Thr Gly Val Lys Phe Ala Val Phe Gly Leu Gly Asn Lys			
165	170	175	
Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Gln Arg Leu			
40	180	185	190
Glu Gln Leu Gly Ala Gln Arg Ile Phe Glu Leu Gly Leu Gly Asp Asp			
195	200	205	
Asp Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp			
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Pro Ala Val Cys Glu Phe Phe Gly Val Glu Ala Thr Gly Glu Glu Ser			
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Ser Ile Arg Gln Tyr Glu Leu Val Val His Glu Asp Met Asp Thr Ala			
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Lys Val Tyr Thr Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln			
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Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Ala Val Thr Thr			
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Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu			
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Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val			
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Ala Val Tyr Pro Ala Asn Asp Ser Thr Leu Val Asn Gln Ile Gly Glu			

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	Ile Leu Gly Ala Asp Leu Asp Val Ile Met Ser Leu Asn Asn Leu Asp			
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	Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Thr Tyr Arg			
5	355	360	365	
	Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn			
	370	375	380	
	Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu			
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10	His Leu His Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu Tyr			
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	Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln			
	420	425	430	
	Asp Tyr Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu			
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	Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val			
	450	455	460	
	His Pro Asn Ser Val His Ile Cys Ala Val Ala Val Glu Tyr Glu Ala			
	465	470	475	480
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	485	490	495	
	Lys Glu Pro Ala Gly Glu Asn Gly Arg Arg Ala Leu Val Pro Met Phe			
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	Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Pro Thr Thr Pro Val			
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	Glu Glu Leu Ala Arg Phe His Lys Asp Gly Ala Leu Thr Gln Leu Asn			
	580	585	590	
	Val Ala Phe Ser Arg Glu Gln Ala His Lys Val Tyr Val Gln His Leu			
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	Leu Lys Arg Asp Lys Glu His Leu Trp Lys Leu Ile His Glu Gly Gly			
	610	615	620	
	Ala His Ile Tyr Val Cys Gly Asp Ala Arg Asn Met Ala Lys Asp Val			
	625	630	635	640
40	Gln Asn Thr Phe Tyr Asp Ile Val Ala Glu Phe Gly Pro Met Glu His			
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	gtgttctacg gtcggcagac ggggactgca gaggagttt ccaaccgcct gtccaaggac	300
	gcccaccgct acggatgcg aggcatgtca gcccggccctg aggatgtga cctggccgac	360
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 10 Glu Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn Ile Ile
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 Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala Asn Arg
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 Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ser Ala Asp
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 Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu Ile Asp
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 Asp Leu Ser Gly Val Lys Phe Ala Val Phe Gly Leu Gly Asn Lys Thr
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 Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Lys Arg Leu Glu
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 Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp Pro
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 30 Ala Val Cys Glu His Phe Gly Val Glu Ala Thr Gly Glu Glu Ser Ser
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 Val Tyr Met Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln Lys
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 Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu Leu
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 40 Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val Ala
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 Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Ser Tyr Arg Thr
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 Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn Val
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 50 Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu Leu
 385 390 395 400
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 Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln Asp
 55 420 425 430
 Cys Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu Pro
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Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val His
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 Pro Asn Ser Val His Ile Cys Ala Val Val Val Glu Tyr Glu Thr Lys
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 Glu Pro Val Gly Glu Asn Gly Gly Arg Ala Leu Val Pro Met Phe Val
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 Arg Lys Ser Gln Leu Arg Leu Pro Phe Lys Ala Thr Thr Pro Val Ile
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 15 Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr Leu Tyr Arg Glu
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 Ala Phe Ser Arg Glu Gln Ser His Lys Val Tyr Val Gln His Leu Leu
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 Lys Gln Asp Arg Glu His Leu Trp Lys Leu Ile Glu Gly Gly Ala His
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 25 Thr Phe Tyr Asp Ile Val Ala Glu Leu Gly Ala Met Glu His Ala Gln
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 Pro Ala Val Cys Glu His Phe Gly Val Glu Ala Thr Gly Glu Glu Ser
 10 225 230 235 240
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 Lys Val Tyr Met Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln
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 15 Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Ala Val Thr Thr
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 Ala Val Tyr Pro Ala Asn Asp Ser Ala Leu Val Asn Gln Leu Gly Lys
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 25 Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Ser Tyr Arg
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 Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn
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 Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu
 30 385 390 395 400
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 405 410 415
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 35 Asp Cys Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu
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 Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val
 450 455 460
 His Pro Asn Ser Val His Ile Cys Ala Val Val Val Glu Tyr Glu Thr
 40 465 470 475 480
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 Lys Glu Pro Ala Gly Glu Asn Gly Arg Ala Leu Val Pro Met Phe
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 565 570 575
 Glu Glu Leu Ala Gln Phe His Arg Asp Gly Ala Leu Thr Gln Leu Asn
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 55 Val Ala Phe Ser Arg Glu Gln Ser His Lys Val Tyr Val Gln His Leu
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 Leu Lys Gln Asp Arg Glu His Leu Trp Lys Leu Ile Glu Gly Gly Ala

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	Asn Thr Phe Tyr Asp Ile Val Ala Glu Leu Gly Ala Met Glu His Ala		
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	Leu Ile Val Gly Leu Leu Thr Tyr Trp Phe Leu Phe Arg Lys Lys Lys		
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	Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ser Ala		
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	Asp Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu Ile		
	115	120	125
	Asp Asn Ala Leu Val Val Phe Cys Met Ala Thr Tyr Gly Glu Gly Asp		
	130	135	140
35	Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Thr Asp		
	145	150	155
	Val Asp Leu Ser Gly Val Lys Phe Ala Val Phe Gly Leu Gly Asn Lys		
	165	170	175
	Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Lys Arg Leu		
40	180	185	190
	Glu Gln Leu Gly Ala Gln Arg Ile Phe Glu Leu Gly Leu Gly Asp Asp		
	195	200	205
	Asp Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp		
	210	215	220
45	Pro Ala Val Cys Glu His Phe Gly Val Glu Ala Thr Gly Glu Glu Ser		
	225	230	235
	Ser Ile Arg Gln Tyr Glu Leu Val Val His Thr Asp Ile Asp Ala Ala		
	245	250	255
	Lys Val Tyr Met Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln		
50	260	265	270
	Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Ala Val Thr Thr		
	275	280	285
	Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu		
	290	295	300
55	Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val		
	305	310	315
	Ala Val Tyr Pro Ala Asn Asp Ser Ala Leu Val Asn Gln Leu Gly Lys		
	320		

	325	330	335	
	Ile Leu Gly Ala Asp Leu Asp Val Val Met Ser Leu Asn Asn Leu Asp			
	340	345	350	
	Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Ser Tyr Arg			
5	355	360	365	
	Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn			
	370	375	380	
	Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu			
	385	390	395	400
10	Leu Leu Arg Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu Tyr			
	405	410	415	
	Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln			
	420	425	430	
	Asp Cys Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu			
15	435	440	445	
	Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val			
	450	455	460	
	His Pro Asn Ser Val His Ile Cys Ala Val Val Val Glu Tyr Glu Thr			
	465	470	475	480
20	Lys Ala Gly Arg Ile Asn Lys Gly Val Ala Thr Asn Trp Leu Arg Ala			
	485	490	495	
	Lys Glu Pro Ala Gly Glu Asn Gly Gly Arg Ala Leu Val Pro Met Phe			
	500	505	510	
	Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Ala Thr Thr Pro Val			
25	515	520	525	
	Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Ile Gly Phe Ile			
	530	535	540	
	Gln Glu Arg Ala Trp Leu Arg Gln Gln Gly Lys Glu Val Gly Glu Thr			
	545	550	555	560
30	Leu Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr Leu Tyr Arg			
	565	570	575	
	Glu Glu Leu Ala Gln Phe His Arg Asp Gly Ala Leu Thr Gln Leu Asn			
	580	585	590	
	Val Ala Phe Ser Arg Glu Gln Ser His Lys Val Tyr Val Gln His Leu			
35	595	600	605	
	Leu Lys Gln Asp Arg Glu His Leu Trp Lys Leu Ile Glu Gly Ala			
	610	615	620	
	His Ile Tyr Val Cys Gly Asp Ala Arg Asn Met Ala Arg Asp Val Gln			
	625	630	635	640
40	Asn Thr Phe Tyr Asp Ile Val Ala Glu Leu Gly Ala Met Glu His Ala			
	645	650	655	
	Gln Ala Val Asp Tyr Ile Lys Lys Leu Met Thr Lys Gly Arg Tyr Ser			
	660	665	670	
	Leu Asp Val Trp Ser			
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	Leu Ile Val Gly Leu Ile Thr Tyr Trp Phe Leu Phe Arg Lys Lys			

	35	40	45
	Glu Glu Val Pro Glu Phe Thr Lys Ile Gln Ala Pro Thr Ser Ser Ser		
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	Val Lys Glu Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn		
	65	70	75
	Ile Val Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala		
	85	90	95
	Asn Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ala		
10	100	105	110
	Ala Asp Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu		
	115	120	125
	Ile Asn Asn Ala Leu Ala Val Phe Cys Met Ala Thr Tyr Gly Glu Gly		
	130	135	140
15	Asp Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Thr		
	145	150	155
	Asp Val Asp Leu Ser Gly Val Lys Tyr Ala Val Phe Gly Leu Gly Asn		
	165	170	175
	Lys Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Gln Arg		
	180	185	190
20	Leu Glu Gln Leu Gly Ala Gln Arg Ile Phe Glu Leu Gly Met Gly Asp		
	195	200	205
	Asp Asp Ala Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe		
	210	215	220
25	Trp Pro Ala Val Cys Glu His Phe Gly Val Glu Ala Thr Gly Glu Glu		
	225	230	235
	Ser Ser Ile Arg Gln Tyr Glu Leu Val Leu His Thr Asp Ile Asp Val		
	245	250	255
	Ala Lys Val Tyr Gln Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn		
	260	265	270
30	Gln Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Thr Val Thr		
	275	280	285
	Thr Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu		
	290	295	300
35	Glu Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His		
	305	310	315
	Val Ala Val Tyr Pro Ala Asn Asp Ser Ala Leu Val Asn Gln Leu Gly		
	325	330	335
	Glu Ile Leu Gly Ala Asp Leu Asp Val Val Met Ser Leu Asn Asn Leu		
	340	345	350
40	Asp Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Ser Tyr		
	355	360	365
	Arg Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr		
	370	375	380
45	Asn Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ala Asp Pro Ala Glu Gln		
	385	390	395
	Glu Gln Leu Arg Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu		
	405	410	415
	Tyr Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu		
	420	425	430
50	Gln Asp Tyr Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu		
	435	440	445
	Leu Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys		
	450	455	460
	Val His Pro Asn Ser Val His Ile Cys Ala Val Ala Val Glu Tyr Glu		
55	465	470	475
	Thr Lys Ala Gly Arg Leu Asn Lys Gly Val Ala Thr Ser Trp Leu Arg		
	485	490	495

Ala Lys Glu Pro Ala Gly Glu Asn Gly Gly Arg Ala Leu Val Pro Met
 500 505 510
 Phe Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Ala Thr Thr Pro
 515 520 525
 5 Val Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Ile Gly Phe
 530 535 540
 Ile Gln Glu Arg Ala Trp Leu Arg Gln Gln Gly Lys Glu Val Gly Glu
 545 550 555 560
 Thr Leu Leu Tyr Tyr Gly Cys Arg Arg Ala Ala Glu Asp Tyr Leu Tyr
 10 565 570 575
 Arg Glu Glu Leu Ala Gly Phe Gln Lys Asp Gly Thr Leu Ser Gln Leu
 580 585 590
 Asn Val Ala Phe Ser Arg Glu Gln Ala Gln Lys Val Tyr Val Gln His
 595 600 605
 15 Leu Leu Arg Arg Asp Lys Glu His Leu Trp Arg Leu Ile His Glu Gly
 610 615 620
 Gly Ala His Ile Tyr Val Cys Gly Asp Ala Arg Asn Met Ala Arg Asp
 625 630 635 640
 Val Gln Asn Thr Phe Tyr Asp Ile Val Ala Glu Leu Gly Ala Met Glu
 20 645 650 655
 His Ala Gln Ala Val Asp Tyr Val Lys Lys Leu Met Thr Lys Gly Arg
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 Tyr Ser Leu Asp Val Trp Ser
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 Ala Glu Glu Val Ser Leu Phe Ser Thr Thr Asp Met Val Leu Phe Ser
 35 20 25 30
 Leu Ile Val Gly Val Leu Thr Tyr Trp Phe Ile Phe Arg Lys Lys Lys
 35 40 45
 Glu Glu Ile Pro Glu Phe Ser Lys Ile Gln Thr Thr Ala Pro Pro Val
 50 55 60
 40 Lys Glu Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn Ile
 65 70 75 80
 Ile Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala Asn
 85 90 95
 Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ser Ala
 45 100 105 110
 Asp Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu Ile
 115 120 125
 Asp Lys Ser Leu Val Val Phe Cys Met Ala Thr Tyr Gly Glu Gly Asp
 130 135 140
 50 Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Thr Asp
 145 150 155 160
 Val Asp Leu Thr Gly Val Lys Phe Ala Val Phe Gly Leu Gly Asn Lys
 165 170 175
 Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Gln Arg Leu
 55 180 185 190
 Glu Gln Leu Gly Ala Gln Arg Ile Phe Glu Leu Gly Leu Gly Asp Asp
 195 200 205

Asp Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp
 210 215 220
 Pro Ala Val Cys Glu Phe Phe Gly Val Glu Ala Thr Gly Glu Glu Ser
 225 230 235 240
 5 Ser Ile Arg Gln Tyr Glu Leu Val Val His Glu Asp Met Asp Val Ala
 245 250 255
 Lys Val Tyr Thr Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln
 260 265 270
 Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Ala Val Thr Ala
 10 275 280 285
 Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu
 290 295 300
 Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val
 305 310 315 320
 15 Ala Val Tyr Pro Ala Asn Asp Ser Ala Leu Asn Gln Ile Gly Glu
 325 330 335
 Ile Leu Gly Ala Asp Leu Asp Val Ile Met Ser Leu Asn Asn Leu Asp
 340 345 350
 Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Thr Tyr Arg
 20 355 360 365
 Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn
 370 375 380
 Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu
 385 390 395 400
 25 His Leu His Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu Tyr
 405 410 415
 Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln
 420 425 430
 Asp Tyr Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu
 30 435 440 445
 Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val
 450 455 460
 His Pro Asn Ser Val His Ile Cys Ala Val Ala Val Glu Tyr Glu Ala
 465 470 475 480
 35 Lys Ser Gly Arg Val Asn Lys Gly Val Ala Thr Ser Trp Leu Arg Ala
 485 490 495
 Lys Glu Pro Ala Gly Glu Asn Gly Gly Arg Ala Leu Val Pro Met Phe
 500 505 510
 Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Ser Thr Thr Pro Val
 40 515 520 525
 Ile Met Val Gly Pro Gly Thr Gly Ile Ala Pro Phe Met Gly Phe Ile
 530 535 540
 Gln Glu Arg Ala Trp Leu Arg Glu Gln Gly Lys Glu Val Gly Glu Thr
 545 550 555 560
 45 Leu Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr Leu Tyr Arg
 565 570 575
 Glu Glu Leu Ala Arg Phe His Lys Asp Gly Ala Leu Thr Gln Leu Asn
 580 585 590
 Val Ala Phe Ser Arg Glu Gln Ala His Lys Val Tyr Val Gln His Leu
 50 595 600 605
 Leu Lys Arg Asp Arg Glu His Leu Trp Lys Leu Ile His Glu Gly Gly
 610 615 620
 Ala His Ile Tyr Val Cys Gly Asp Ala Arg Asn Met Ala Lys Asp Val
 625 630 635 640
 55 Gln Asn Thr Phe Tyr Asp Ile Val Ala Glu Phe Gly Pro Met Glu His
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 Thr Gln Ala Val Asp Tyr Val Lys Lys Leu Met Thr Lys Gly Arg Tyr

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	Ser Leu Asp Val Trp Ser		
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15	Leu Ile Val Gly Val Leu Thr Tyr Trp Phe Ile Phe Lys Lys Lys		
	35	40	45
	Glu Glu Ile Pro Glu Phe Ser Lys Ile Gln Thr Thr Ala Pro Pro Val		
	50	55	60
	Lys Glu Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn Ile		
20	65	70	75
	Ile Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala Asn		
	85	90	95
	Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ser Ala		
	100	105	110
25	Asp Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu Ile		
	115	120	125
	Asp Lys Ser Leu Val Val Phe Cys Met Ala Thr Tyr Gly Glu Gly Asp		
	130	135	140
	Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Thr Asp		
30	145	150	155
	Val Asp Leu Thr Gly Val Lys Phe Ala Val Phe Gly Leu Gly Asn Lys		
	165	170	175
	Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Gln Arg Leu		
	180	185	190
35	Glu Gln Leu Gly Ala Gln Arg Ile Phe Glu Leu Gly Leu Gly Asp Asp		
	195	200	205
	Asp Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp		
	210	215	220
	Pro Ala Val Cys Glu Phe Phe Gly Val Glu Ala Thr Gly Glu Glu Ser		
40	225	230	235
	Ser Ile Arg Gln Tyr Glu Leu Val Val His Glu Asp Met Asp Thr Ala		
	245	250	255
	Lys Val Tyr Thr Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln		
	260	265	270
45	Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Ala Val Thr Thr		
	275	280	285
	Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu		
	290	295	300
	Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val		
50	305	310	315
	Ala Val Tyr Pro Ala Asn Asp Ser Thr Leu Val Asn Gln Ile Gly Glu		
	325	330	335
	Ile Leu Gly Ala Asp Leu Asp Val Ile Met Ser Leu Asn Asn Leu Asp		
	340	345	350
55	Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Thr Tyr Arg		
	355	360	365
	Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn		

	370	375	380	
	Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu			
	385	390	395	400
5	His Leu His Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu Tyr			
	405	410	415	
	Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln			
	420	425	430	
	Asp Tyr Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu			
	435	440	445	
10	Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val			
	450	455	460	
	His Pro Asn Ser Val His Ile Cys Ala Val Ala Val Glu Tyr Glu Ala			
	465	470	475	480
	Lys Ser Gly Arg Val Asn Lys Gly Val Ala Thr Ser Trp Leu Arg Thr			
15	485	490	495	
	Lys Glu Pro Ala Gly Glu Asn Gly Arg Arg Ala Leu Val Pro Met Phe			
	500	505	510	
	Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Pro Thr Thr Pro Val			
	515	520	525	
20	Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Met Gly Phe Ile			
	530	535	540	
	Gln Glu Arg Ala Trp Leu Arg Glu Gln Gly Lys Glu Val Gly Glu Thr			
	545	550	555	560
	Leu Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr Leu Tyr Arg			
25	565	570	575	
	Glu Glu Leu Ala Arg Phe His Lys Asp Gly Ala Leu Thr Gln Leu Asn			
	580	585	590	
	Val Ala Phe Ser Arg Glu Gln Ala His Lys Val Tyr Val Gln His Leu			
	595	600	605	
30	Leu Lys Arg Asp Lys Glu His Leu Trp Lys Leu Ile His Glu Gly Gly			
	610	615	620	
	Ala His Ile Tyr Val Cys Gly Asp Ala Arg Asn Met Ala Lys Asp Val			
	625	630	635	640
	Gln Asn Thr Phe Tyr Asp Ile Val Ala Glu Phe Gly Pro Met Glu His			
35	645	650	655	
	Thr Gln Ala Val Asp Tyr Val Lys Lys Leu Met Thr Lys Gly Arg Tyr			
	660	665	670	
	Ser Leu Asp Val Trp Ser			
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	<400> 56			
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	Ala Glu Glu Val Ser Leu Phe Ser Ala Thr Asp Met Val Leu Phe Ser			
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	Leu Ile Val Gly Leu Leu Thr Tyr Trp Phe Ile Phe Arg Lys Lys Lys			
	35	40	45	
	Asp Glu Val Pro Glu Phe Ser Lys Ile Glu Thr Thr Ser Ser Val			
	50	55	60	
55	Lys Asp Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn Ile			
	65	70	75	80
	Ile Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala Asn			

	85	90	95
	Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ala Ala		
	100	105	110
5	Asp Pro Glu Glu Tyr Asp Leu Ser Asp Leu Ser Ser Leu Pro Glu Ile		
	115	120	125
	Glu Asn Ala Leu Ala Val Phe Cys Met Ala Thr Tyr Gly Glu Gly Asp		
	130	135	140
10	Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Ala Asp		
	145	150	155
	Val Asp Leu Thr Gly Val Lys Tyr Ala Val Phe Gly Leu Gly Asn Lys		
	165	170	175
	Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Lys Arg Leu		
	180	185	190
15	Glu Gln Leu Gly Ala Gln Arg Ile Phe Asp Leu Gly Leu Gly Asp Asp		
	195	200	205
	Asp Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp		
	210	215	220
	Pro Ala Val Cys Glu His Phe Gly Val Glu Ala Thr Gly Glu Glu Ser		
	225	230	235
20	Ser Ile Arg Gln Tyr Glu Leu Val Val His Thr Asp Met Asp Thr Ala		
	245	250	255
	Val Val Tyr Thr Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln		
	260	265	270
25	Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Val Val Thr Thr		
	275	280	285
	Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu		
	290	295	300
	Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val		
	305	310	315
30	Ala Val Tyr Pro Ala Asn Asp Ser Ala Leu Val Asn Gln Leu Gly Glu		
	325	330	335
	Ile Leu Gly Thr Asp Leu Asp Ile Val Met Ser Leu Asn Asn Leu Asp		
	340	345	350
35	Glu Glu Ser Asn Lys Arg His Pro Phe Pro Cys Pro Thr Thr Tyr Arg		
	355	360	365
	Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn		
	370	375	380
	Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu		
	385	390	395
40	Gln Leu Arg Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu Tyr		
	405	410	415
	Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln		
	420	425	430
45	Asp Tyr Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Arg Leu		
	435	440	445
	Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val		
	450	455	460
	His Pro Asn Ser Val His Ile Cys Ala Val Val Val Glu Tyr Glu Thr		
	465	470	475
50	Lys Ser Gly Arg Val Asn Lys Gly Val Ala Thr Ser Trp Leu Arg Ala		
	485	490	495
	Lys Glu Pro Ala Gly Glu Asn Gly Arg Arg Ala Leu Val Pro Met Phe		
	500	505	510
55	Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Ala Thr Thr Pro Val		
	515	520	525
	Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Ile Gly Phe Ile		
	530	535	540

Gln Glu Arg Ala Trp Leu Gln Glu Gln Gly Lys Glu Val Gly Glu Thr
 545 550 555 560
 Leu Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr Leu Tyr Arg
 565 570 575
 5 Glu Glu Leu Ala Gln Phe His Ala Lys Gly Ala Leu Thr Arg Leu Ser
 580 585 590
 Val Ala Phe Ser Arg Glu Gln Pro Gln Lys Val Tyr Val Gln His Leu
 595 600 605
 Leu Lys Arg Asp Lys Glu His Leu Trp Lys Leu Ile His Asp Gly Gly
 610 615 620
 10 Ala His Ile Tyr Ile Cys Gly Asp Ala Arg Asn Met Ala Arg Asp Val
 625 630 635 640
 Gln Asn Thr Phe Cys Asp Ile Val Ala Glu Gln Gly Pro Met Glu His
 645 650 655
 15 Ala Gln Ala Val Asp Tyr Val Lys Lys Leu Met Thr Lys Gly Arg Tyr
 660 665 670
 Ser Leu Asp Val Trp Ser
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20 <210> 57
 <211> 19
 <212> DNA
 <213> Bacteriophage SP6 primer

25 <400> 57
 gattttagtg acactatacg 19

30 <210> 58
 <211> 44
 <212> DNA
 <213> Artificial Sequence

35 <220>
 <223> Synthetic adapter with NotI site and poly dT tail

40 <400> 58
 gactagttct agatcgcgag cggccgcctt tttttttttt tttt 44

45 <210> 59
 <211> 16
 <212> DNA
 <213> Artificial Sequence

50 <220>
 <223> Top Strand of a SalI adapter

55 <400> 59
 tcgacccacg cgtccg 16

<210> 60
 <211> 12
 <212> DNA
 <213> Artificial Sequence

	<220>	
	<223> Bottom Strand of a SalI adapter, the first base is	
	phosphorylated	
5	<221> misc_feature	
	<222> (1)...(1)	
	<223> The first base is phosphorylated	
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	gcctgcgcac cc	12
	<210> 61	
	<211> 21	
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	<213> human oxidoreductase primer 1C	
	<400> 61	
	gtggaccaca agctcgta ct	21
20	<210> 62	
	<211> 22	
	<212> DNA	
	<213> human oxidoreductase primer 2C	
25	<400> 62	
	catcgaccac ctgtgtgagc tg	22
	<210> 63	
30	<211> 22	
	<212> DNA	
	<213> human oxidoreductase primer 2D	
	<400> 63	
35	gtacaggtag tcctcatccg ag	22
	<210> 64	
	<211> 3710	
	<212> DNA	
40	<213> Aspergillus niger NADP CYP450 oxidoreductaseZ26838	
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	ctaagttagct ccgtgtcaga gacccggaca ggtatcgtt ctccgaaccc gagactccgg	120
45	gcgaaaaggc caccatcgct caggctacca cctgtgttcc ttccgtcgat cgtcctccct	180
	cgtttccggc tcacggcccc ccaaattatt ggggtctgt tagcagtggg ttccggctct	240
	ctgttcttcc tggatcacac cacggcttac ttctttatcc ttccctttt ctttcttcc	300
	tttcttcctg ttcttccttc ttcccttcca ccccttctt tcttttaacc ccatagcgcc	360
	attctttctt ccgttttatac ttgggttttgg gacgcggcc accttatctc gttccgtgcc	420
50	tcgggtctccg gtgategcac ctggataggc taagcgttagg gaggtgtgac attcttctt	480
	caccttccctt cttttccccg cttcactccg ttcaatcccc cgctccaccc ttccagactc	540
	gccatcgat caagtccggg ctttgcttgc cccgcgtgaa cagccatcacc atggcgcaac	600
	tgcataccct cgatctggtg gtcctggcgg tgcctttgggt gggtagcgtg gcctacttca	660
	ccaaggccac ctactgggca gttgaaaga cccgtatgcc tctaccggcc cccggatga	720
55	acggcgccgc taaggctggc aagactcgga acatcattga gaagatggaa gaaacgggca	780
	agaattgtgt tattttctac ggatcgaaa ctggaaaccgc tgaggactac gcctccagat	840
	tggccaagga aggatctcag cgcttcggcc tcaagaccat ggtggctgac ctcgaggaat	900

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	Lys Thr Arg Met Pro Leu Pro Ala Pro Arg Met Asn Gly Ala Ala Lys			
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	Ala Gly Lys Thr Arg Asn Ile Ile Glu Lys Met Glu Glu Thr Gly Lys			
5	50	55	60	
	Asn Cys Val Ile Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Asp Tyr			
	65	70	75	80
	Ala Ser Arg Leu Ala Lys Glu Gly Ser Gln Arg Phe Gly Leu Lys Thr			
	85	90	95	
10	Met Val Ala Asp Leu Glu Glu Tyr Asp Tyr Glu Asn Leu Asp Gln Phe			
	100	105	110	
	Pro Glu Asp Lys Val Ala Phe Phe Val Leu Ala Thr Tyr Gly Glu Gly			
	115	120	125	
	Glu Pro Thr Asp Asn Ala Val Glu Phe Tyr Gln Phe Phe Thr Gly Asp			
15	130	135	140	
	Asp Val Ala Phe Glu Ser Ala Ser Ala Asp Glu Lys Pro Leu Ser Lys			
	145	150	155	160
	Leu Lys Tyr Val Ala Phe Gly Leu Gly Asn Asn Thr Tyr Glu His Tyr			
	165	170	175	
20	Asn Ala Met Val Arg Gln Val Asp Ala Ala Phe Gln Lys Leu Gly Pro			
	180	185	190	
	Gln Arg Ile Gly Ser Ala Gly Glu Gly Asp Asp Gly Ala Gly Thr Met			
	195	200	205	
	Glu Glu Asp Phe Leu Ala Trp Lys Glu Pro Met Trp Ala Ala Leu Ser			
25	210	215	220	
	Glu Ser Met Asp Leu Glu Glu Arg Glu Ala Val Tyr Glu Pro Val Phe			
	225	230	235	240
	Cys Val Thr Glu Asn Glu Ser Leu Ser Pro Glu Asp Glu Thr Val Tyr			
	245	250	255	
30	Leu Gly Glu Pro Thr Gln Ser His Leu Gln Gly Thr Pro Lys Gly Pro			
	260	265	270	
	Tyr Ser Ala His Asn Pro Phe Ile Ala Pro Ile Ala Glu Ser Arg Glu			
	275	280	285	
	Leu Phe Thr Val Lys Asp Arg Asn Cys Leu His Met Glu Ile Ser Ile			
35	290	295	300	
	Ala Gly Ser Asn Leu Ser Tyr Gln Thr Gly Asp His Ile Ala Val Trp			
	305	310	315	320
	Pro Thr Asn Ala Gly Ala Glu Val Asp Arg Phe Leu Gln Val Phe Gly			
	325	330	335	
40	Leu Glu Gly Lys Arg Asp Ser Val Ile Asn Ile Lys Gly Ile Asp Val			
	340	345	350	
	Thr Ala Lys Val Pro Ile Pro Thr Pro Thr Thr Tyr Asp Ala Ala Val			
	355	360	365	
	Arg Tyr Tyr Met Glu Val Cys Ala Pro Val Ser Arg Gln Phe Val Ala			
45	370	375	380	
	Thr Leu Ala Ala Phe Ala Pro Met Arg Lys Ala Arg Gln Arg Leu Cys			
	385	390	395	400
	Val Trp Val Ala Gln Gly Leu Phe Pro Arg Glu Gly His Gln Pro Met			
	405	410	415	
50	Leu Gln His Ala Gln Ala Leu Gln Ser Ile Thr Ser Lys Pro Phe Ser			
	420	425	430	
	Ala Val Pro Phe Ser Leu Leu Ile Glu Gly Ile Thr Lys Leu Gln Pro			
	435	440	445	
	Arg Tyr Tyr Ser Ile Ser Ser Ser Ser Leu Val Gln Lys Asp Lys Ile			
55	450	455	460	
	Ser Ile Thr Ala Val Val Glu Ser Val Arg Leu Pro Gly Ala Ser His			
	465	470	475	480

Met Val Lys Gly Val Thr Thr Asn Tyr Leu Leu Ala Leu Lys Gln Lys
485 490 495
Gln Asn Gly Arg Ser Leu Ser Arg Pro Ser Arg Leu Asp Leu Leu His
500 505 510
5 His Gly Pro Arg Asn Lys Tyr Asp Gly Ile His Val Pro Val His Val
515 520 525
Arg His Ser Asn Phe Lys Leu Pro Ser Asp Pro Ser Arg Pro Ile Ile
530 535 540
Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly Phe Ile Gln
10 545 550 555 560
Glu Arg Ala Ala Leu Ala Ala Lys Gly Glu Lys Val Gly Pro Thr Val
565 570 575
Leu Phe Phe Gly Cys Arg Lys Ser Asp Glu Asp Phe Leu Tyr Lys Asp
580 585 590
15 Glu Trp Lys Thr Tyr Gln Asp Gln Leu Gly Asp Asn Leu Lys Ile Ile
595 600 605
Thr Ala Phe Ser Arg Glu Gly Pro Gln Lys Val Tyr Val Gln His Arg
610 615 620
Leu Arg Glu His Ser Glu Leu Val Ser Asp Leu Leu Lys Gln Lys Ala
20 625 630 635 640
Thr Phe Tyr Val Cys Gly Asp Ala Ala Asn Met Ala Arg Glu Val Asn
645 650 655
Leu Val Leu Gly Gln Ile Ile Ala Ala Gln Arg Gly Leu Pro Ala Glu
660 665 670
25 Lys Gly Glu Glu Met Val Lys His Met Arg Arg Arg Gly Arg Tyr Gln
675 680 685
Glu Asp Val Trp Ser
690

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